

The properties of Kastanozems at steppe of northeast Mongolia and its relationship to the climate

Maki Asano[1]; Kenji Tamura[2]; Teruo Higashi[2]; Yuji Maejima[3]

[1] Biosphere Resource Sci. Tec., Univ. Tsukuba ; [2] Inst. Appli. Biochem., Univ. Tsukuba; [3] RCNST., Univ. Tokyo

In northeast Mongolia, ecotone is distributed. The changes in human activity and climatic conditions would cause the desertification in this region. To prevent and combat the desertification, the data of soil properties are essential.

In soils of arid and semi-arid regions, calcic horizon (Bk horizon), is common. It was show that the depth of Bk horizon is related to annual precipitation. Pedogenic calcium carbonate forms in isotopic equilibrium with soil CO₂. That is dissolved in and transferred by soil water. It is already known that the ¹³C / ¹²C ratio of pedogenic calcium carbonate reflect the difference in CO₂ sources such as precipitation, respiration by living plant roots, decomposing soil organic matter and parent materials. While, the ¹⁴C / ¹²C ratio of pedogenic calcium carbonate decrease with time. Therefore, ¹³C / ¹²C and ¹⁴C / ¹²C ratio could be an index of water movement contain in pedogenic calcium carbonate in soil profile. In this study, we conducted the analyses several soil physical and chemical properties, and obtained ¹³C / ¹²C and ¹⁴C / ¹²C ratio of pedogenic calcium carbonate in Bk horizons by the AMS (Accelerator Mass Spectrometry) method.

Water soluble ions of soils showed higher content at site with lower precipitation. The ¹⁴C / ¹²C ratio was high in the upper part in Bk horizon at the site with high amount of precipitation. In contrast, the ¹⁴C / ¹²C ratio was lower the upper part of Bk horizon at the site with lower amount of precipitation. The ¹³C / ¹²C ratio show difference of CO₂ sources, they shows difference of water movement in soils each site.